

EVALUATION OF  
OFF-SET POST MOUNTED DELINEATORS

Final Report

April, 1983

Prepared By  
Montana Department of Highways  
Program Development Division  
Project Analysis Bureau

Contract No. DOT-FH-11-8611, No. 4

OFF-SET POST-MOUNTED DELINEATORS  
PROJECT ANALYSIS BUREAU - MONTANA DEPARTMENT OF HIGHWAYS  
APRIL, 1983

HISTORY:

Post mounted side of the road delineation aids the motorist by defining the roadway ahead. One problem encountered with the standard metal delineator post now in use is its inability to return to its original position after an impact. This creates additional maintenance costs for labor and material to replace the damaged post in addition to the lack of delineation while the post is out of service.

Metal delineator posts are also damaged by many other conditions such as bending due to the impact of snow thrown by a snowplow. Standard delineator placement is often a hinderance to maintenance forces when performing operations on the shoulder of the roadway.

New types of delineator posts are continually being created and tested to find the most cost effective application possible. One such post is the off-set post-mounted design by Prairie Products of Gilford, Montana. These delineator assemblys were tested at three sites on Montana's primary routes since June of 1981. The installations were funded through a special demonstration project coordinated between the Federal Highway Administration and the State of Montana.

DESIGN:

The current standard metal delineator post consists of a six foot piece of channel steel with a reflective delineator fastened to the post to achieve a 4' mounting height. The assembly is installed 2 to 6 feet from the edge of the roadway shoulder.

The experimental delineator tested in this study utilizes the same steel post, however it is installed 2 feet further away from the roadway shoulder than the standard installation. Attached to the post is a hinged arm approximately 2' in length that extends outward toward the roadway edge. A place is provided on this arm to attach a reflective delineator. The intent is to allow the hinged arm and delineator to pivot on the post upon impact and then return to its original position. (See illustration, page 3).

The intent of the arm was to allow a vehicle additional recovery area when leaving the edge of the roadway. An automobile could strike the "arm" with none or minimal damage to the vehicle. A similar hit to a standard post would result in greater damage to a vehicle. The bent rod is designed to come in contact with the windshield frame first. The frame pushes the rod from the notched adapter and makes up to a 180° turn. The rod should swing back to its original position.

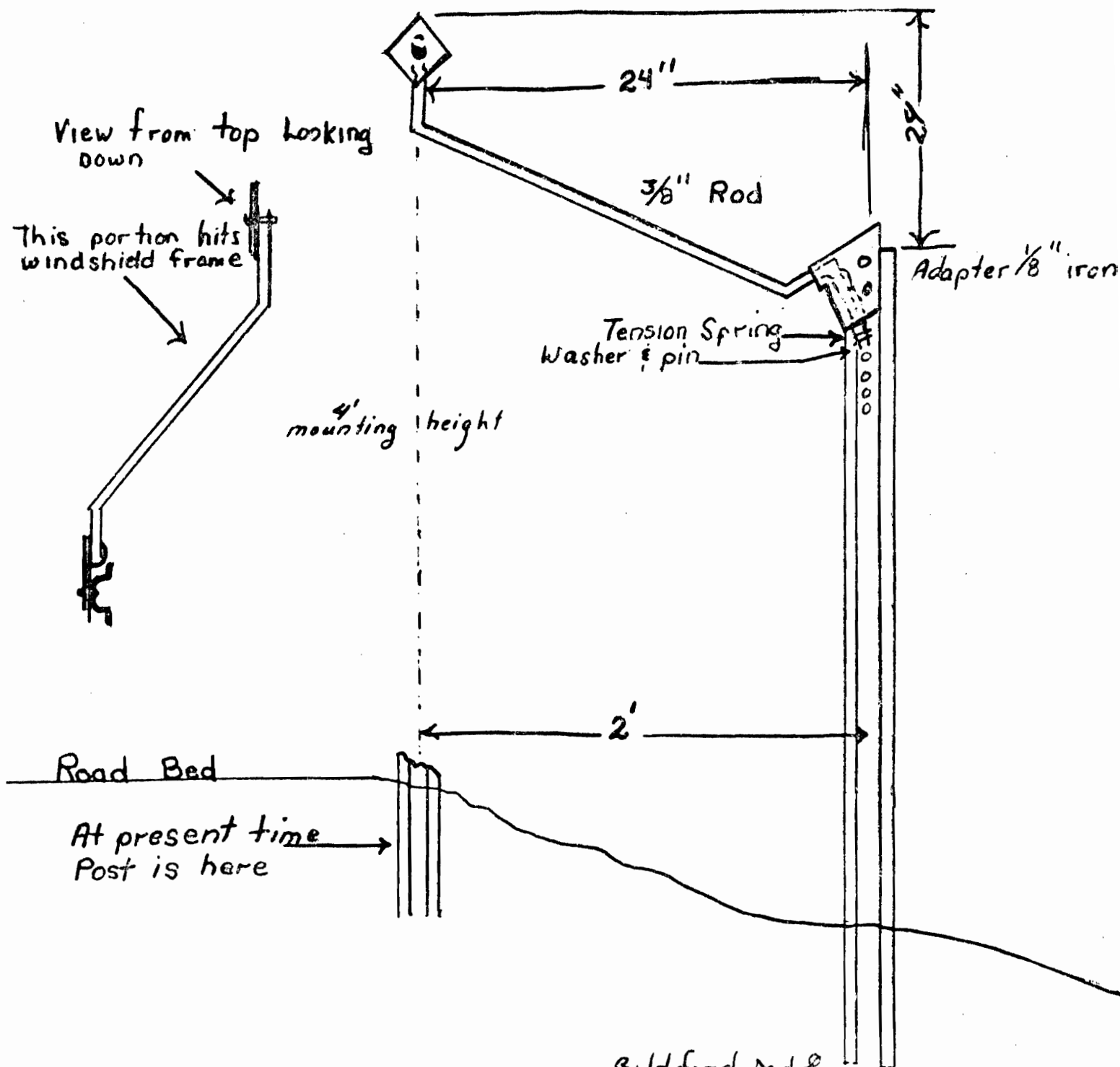
The tension spring that is shown in the illustration was not installed. This item possibly would have helped prevent the arms from sticking on the opposite side of the post, especially when being hit by snow from the plows. This has been noted as occurring in the evaluation.

#### EVALUATION:

Department of Highways Maintenance personnel installed and have been monitoring the installations. Their reports are included in the appendix. A summary of their observations follows:

#### Disadvantages:

(1) Installing the new type delineator was more work.



B. Idford Mtg.  
3/14/79 E. L. G.

- (2) The rod must be mounted on the bracket before mounting on post or it binds on the bracket.
- (3) The arm material is soft and bends easily.
- (4) Arm and bracket tend to rust and will not complete swing.
- (5) When hit by traffic, the arm breaks at the bracket and then does a 270° turn.
- (6) The arms seemed to break easily at the top of the bracket they are set in.
- (7) Pedestrians and bicycle riders hit them with their hands, sticks or whatever and have caused some damage.
- (8) The post must be installed plum in order for the swinging arm to function properly.

Advantages:

- (1) Vandalized or accidentally bent arms are generally easily straightened in place. When necessary they are also quite easily replaced and the breaks welded. Posts are rarely damaged except by direct impact.
- (2) The offset post is considerably more convenient for mowing operations.
- (3) They were found to be extremely beneficial when mowing grass and winging snow.
- (4) Routine maintenance is not appreciably different than for the standard type delineator and post.
- (5) Very visible at night.

The manufacturer has also been monitoring the installations and comments from the maintenance forces. The tension spring as shown in the diagram was not supplied by the manufacturer due to high manufacturing costs. One year after the posts were installed, the hinged arm was redesigned to allow gravitational forces to function better. The new design of hinge was not tested.

COST:

A cost comparison between three types of delineator installations - (1) channel post plus delineator (2) channel post plus swinging arm and delineator, (3) flexible post - shows the following:

<u>Type of Installation</u>	<u>Channel Post and Delin.</u>	<u>Off-Set</u>	<u>Flexible</u>
Initial Unit Cost	3.69	6.36	8.62
Cost to Install	2.95	5.90	2.95
Total Cost	6.64	12.26	11.59

CONCLUSIONS:

Based on information presented, the offset post mounted delineator could provide a beneficial measure in specific locations, such as areas with steep banks or where a high incidence of delineator post loss is being experienced due to impacts from snow or overwidth vehicles such as farm machinery. However the problems that have been observed particularly the weakness of the swinging arm and its inability to return to its original position does not present a cost-effective measure at this time.

CMZ/dk/224A

## APPENDIX

INTER-DEPARTMENTAL MEMORANDUM  
DEPARTMENT OF HIGHWAYS

To: William S. Strizich, P.E., Chief - Project Date: March 24, 1983  
Analysis Bureau  
From: Hazen D. Flickinger, P.E., Chief - Field Mtce. Bureau - Subject: Off-Set Post Mounted  
Havre Delineators.  
File: 1011.05

The performance of the off-set delineators has not been too good. The arm and bracket tend to rust, and when hit by traffic the arms do not turn freely in the bracket but bend causing the arm to break at the bracket.

To date we have straightened about ten (10) arms and brackets and about six (6) have been replaced with conventional delineators because no off-set mount delineator replacements are available.

HDF/cw

MAR 25 1983

*Hazen D. Flickinger*  
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## INTER-DEPARTMENTAL MEMORANDUM

## DEPARTMENT OF HIGHWAYS

Miles City, MT

To William S. Strizich, Chief, Proj. Anal. Bur.

Date February 25, 1983

From Richard L. Tobel, Chief-FMBSubject Offset - Post Mounted  
Delineators  
File: 1011.05

Reference is made to your memorandum dated February 15, 1983 on subject delineators.

Please be advised that the overall performance of the offset marker has been excellent.

Routine maintenance is not appreciably different than for the standard type delineator and post. The significant advantages of the offset marker are.

1. Vandalized or accidentally bent arms are generally easily straightened in place. When necessary they are also quite easily replaced. The arms can be readily straightened and breaks welded when determined feasible. Posts are rarely damaged except by direct impact.
2. The offset post is considerably more convenient for mowing operations.

You are aware that these units were installed in problem areas. We have a few mounted near the Broadus Interchange and at the 90° curve on east Main Street in Miles City, as well as that section of P-23 (MT-59), from milepost 10 to milepost 14.

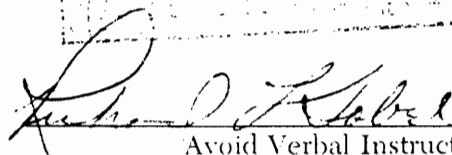
The present condition of the offset delineator system is satisfactory. Of course, the delineator buttons get shot out, damaged or lose their reflectivity and are replaced as with the standard button.

All units are still in place, however we have replaced several arms that were damaged beyond repair.

For this particular country, minimum average snow depths, narrow highways, steep inslopes, etc, the offset system seems to be an effective system.

RLT:mjs  
cc: Div. File

FEB 28 1983



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INTER-DEPARTMENTAL MEMORANDUM  
DEPARTMENT OF HIGHWAYS

To Hank Butzlaff, Supervisor  
Project Planning Section  
From Richard L. Miller, Chief  
Field Maintenance Bureau

Date March 17, 1982  
2220:RLM  
Subject: Special Design  
Delineators

Attached is a copy of a memo from Sectionman Howard Alverson at Big Sky regarding the special delineators installed on US 191, Rte P 50 M.P. 63 to 65.5.

By the way, did some of your crew paint all of these red after they were installed?

RLM:cn  
Attachment

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FILE	

*Richard L. Miller*  
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Complied with 82--1137 R.C.M.

INTER-DEPARTMENTAL MEMORANDUM  
DEPARTMENT OF HIGHWAYS

RECEIVED

MAR 16 1982

DEPT. OF HIGHWAYS  
BOZEMAN, MONTANA

To Dick  
From Howard

Date

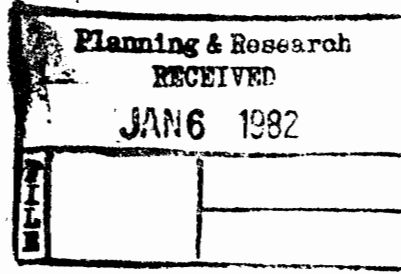
Subject: Flexible delineator arms

After plowing and winging snow for most of the winter with the new delineator arms between M.P. 63 + 65½ on 191, we are basically satisfied with their performance. As with mowing they are alot easier to wing around with out having to pull the whole truck into the oncoming traffic lane. We have had 5 run over, 3 bent or missing arms and one hit by a snow plow which knocked the arm off. They do have a problem with sticking back & staying but as I mentioned last fall I'm sure this is due to not having the springs on them that were shown in the instructions and were never sent to us.

*LA*

Complied with 82--1137 R.C.M.

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Prairie Products  
Box 156  
Gildford, Mt. 59625

Hank Butzlaff  
Montana State of Highways  
Highway Dept.  
Highway Building  
Helena, Mt. 59601

Dear Mr. Butzlaff,

Three of us made a trip to check on the delineator adaptors. We also painted them with fluorescent paint and replaced the bent and broken.

On Lima hill we found one rod missing, but it was gone in the first month after installation, also the bracket was gone, so someone removed this. One was broken off and one was badly bent, all were facing the road and to us looked very good.

At Bozeman we found one broken off and one bent, several failed to return to the correct position, but in each case we found the stake was leaning toward the ditch or not put in straight up and down, there is no way the adaptor could return to it's original position.

At Miles City we were able to talk to Bob Lamb in charge of the delineators. We found one broken off and two badly bent. Bob said they were perfect and he wishes the adaptors were on all the stakes. He also said if asked he would tell you so. He just couldn't say enough for them.

We are sure the redesigning of the bracket will eliminate any more broken rods and also make it easier for the rod to return.

Next time I am in Helena I will bring the bent rods so that you can see the abuse the rods will withstand.

Sincerely,

*Laurence Green*  
Laurence Green

INTER-DEPARTMENTAL MEMORANDUM  
DEPARTMENT OF HIGHWAYS

To: James W. Hahn, Chief - Planning & Research Bureau      Date: November 6, 1981  
From: Edward J. Johnson, Chief - Fld. Mtce. Bureau - Havre      Subject: Offset Post Mounted  
Delineators  
File: 1011.05

Havre reports that installing the new type delineator was a little more work, but not too bad. Found you have to mount rod on bracket before mounting on post. (Nut bound on bracket)

The arm material is real soft and bends real easily. Arm and bracket tend to rust and then will bind and not complete swing. When hit by traffic, arm will break at bracket and do a 270° turn.

Have replaced and straightened about seven (7) and three (3) more need replacing but no replacements are on hand.

EJJ/ew

## INTER-DEPARTMENTAL MEMORANDUM

## DEPARTMENT OF HIGHWAYS

To James W. Hahn, Chief  
Planning & Research Bureau  
From Richard L. Miller, Chief  
Field Maintenance Bureau

Date October 30, 1981  
RLM:2220  
Subject Offset Post Mounted  
Delineators  
File: 1011.05

Our sectionman at Big Sky has advised that there has been some problems with the arms being swung back and staying there. The instructions for installation show them spring mounted, but springs were not included with the ones we installed.

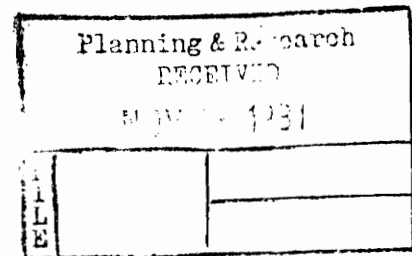
There also has been some vandalism to the arms by hitchhikers, etc. who have bent them down or up, making them inoperable.

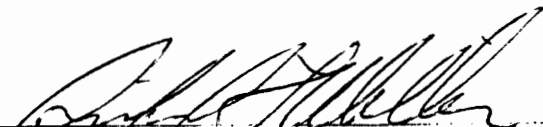
Our crew found that they were out of the way for mowing, which was a big help with that operation.

So far they have worked good during our plowing operations and are very visible at night.

Personally, I think they are strange looking, but if they withstand the winter operations without too many losses, they should work out OK.

RLM:mfp



  
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## INTER-DEPARTMENTAL MEMORANDUM

## DEPARTMENT OF HIGHWAYS

Miles City, Montana

To Jim Hahn, Chief, Planning & ResearchDate June 19, 1981From Richard L. Tobel, Chief-Field Maint. BureauSubject Offset Post Mount  
DelineatorATTN: Hank Butzlaff

Please be advised that subject delineators were erected on a section of Montana 59 between mileposts 10 and 14, approximately 10 miles south of Miles City.

We have also set several of the offset delineators on a problem area curve near the Pine Hills School for Boys, as well as at a corner of the Broadus Interchange W.B. off ramp to Montana 22.

The delineators are working very well. We have experienced no problems with loss other than a centered impact which took out post and all. The offset mount aids the roadside mowing operation considerably, especially on the steeper slopes where only one pass is made.

FORM 4

## INTER-DEPARTMENTAL MEMORANDUM

## DEPARTMENT OF HIGHWAYS

Miles City, Montana

To James W. Hahn, Chief-Planning & Research BureauDate October 21, 1981From Richard L. Tobel, Chief-Field Maint. BureauSubject: Offset Post Mounted  
Delineators

Attached is a summary of subject delineators sent to your office on June 19, 1981.

The delineators continue to function in a completely acceptable manner, and in general, are better than the standard post mount.

RLT:wr

Attachment

cc: Division File

D.D. Gruel

Planning	John
Field Maint.	
File	

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## INTER-DEPARTMENTAL MEMORANDUM

## DEPARTMENT OF HIGHWAYS

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Planning & Research	
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JUN 2 1981	
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RLT:wr

cc: Division File

*DON GRAVEL*

*Richard L. Tobel*  
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